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10/758,565	01/15/2004	Purusottam Sahoo		5904

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EXAMINER

AUSTIN, AARON

ART UNIT PAPER NUMBER

1775

DATE MAILED: 06/19/2006

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**BEFORE THE BOARD OF PATENT APPEALS  
AND INTERFERENCES**

Application Number: 10/758,565  
Filing Date: January 15, 2004  
Appellant(s): SAHOO ET AL.

**MAILED**

JUN 19 2006

**GROUP 1700**

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Francis C. Hand  
For Appellant

**EXAMINER'S ANSWER**

This is in response to the appeal brief filed March 23, 2006 appealing from the Office action mailed October 18, 2005.

**(1) Real Party in Interest**

A statement identifying by name the real party in interest is contained in the brief.

**(2) Related Appeals and Interferences**

The examiner is not aware of any related appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

**(3) Status of Claims**

The statement of the status of claims contained in the brief is correct.

**(4) Status of Amendments After Final**

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

**(5) Summary of Claimed Subject Matter**

The summary of claimed subject matter contained in the brief is correct.

**(6) Grounds of Rejection to be Reviewed on Appeal**

The appellant's statement of the grounds of rejection to be reviewed on appeal is correct.

**(7) Claims Appendix**

The copy of the appealed claims contained in the Appendix to the brief is correct.

**(8) Evidence Relied Upon**

6,716,539	Subramanian	4-2004
6,703,137	Subramanian	3-2004
4,936,745	Vine	6-1990

**(9) Grounds of Rejection**

The following ground(s) of rejection are applicable to the appealed claims:

Claims 1, 2, 4, 5, and 7 are rejected under 35 U.S.C. 102(e) as being anticipated by Subramanian (US 6,716,539). Subramanian '539 teaches a thermal barrier coating having a porous first layer and a second relatively dense layer having a plurality of gaps. Both layers comprise ceramic insulating material YSZ. The first layer comprises pores which serve to arrest the propagation of cracks originating at the vertical gaps. Regarding claims 4 and 5, the first (intermediate) layer may be applied in 1-4 passes of 1-5 mils (0.001-0.0005 inches) per pass. In other words, the first layer may have a thickness of 1-20 mils (0.001-0.02 inches). A bond coat of MCrAlY is formed between the substrate and the thermal barrier coating.

Claims 6, and 8-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (US 6,716,539) in view of Vine et al (US 4,936,745). Subramanian

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'539 teaches a bond coat of MCrAlY but does not give additional examples of bond coatings that may be used. Vine teaches a bond coating for a thermal barrier coating system comprising MCrAlY which may include additions of Hf and Si. The bond coat may be applied with a thickness of 5-10 mils (0.005-0.010 inches). As it is taught by Vine that a MCrAlY layer having additions of Hf and Si is readily used as a bond coating for a thermal barrier coating system, one of ordinary skill in the art at the time of the invention would have found it obvious to use a bond coat of this type in the coating of Subramanian '539 with the full expectation that it would successfully provide adherence of the ceramic coating. Regarding claims 10 and 11, the articles of both Subramanian '137 and '539 are used for turbine engine components.

Claim 3 is rejected under 35 U.S.C. 103(a) as being unpatentable over Subramanian (6,716,539) in view of Subramanian (US 6,703,137). Subramanian '539 teaches a porous bottom layer as discussed above, but does not teach how the porosity is provided. Subramanian '137 teaches a porous first (bottom) layer similar to that of Subramanian '539, and further teaches that the porosity is formed by providing polyester in the layer. It would have been obvious to one of ordinary skill in the art at the time of the invention to form the porosity of the bottom layer of Subramanian '539 by using polyester as taught by Subramanian '137, as it is clearly taught to successfully provide porosity in a zirconia layer and adhered to an underlying MCrAlY layer.

**(10) Response to Argument**

At the outset, Subramanian '539 teaches a thermal barrier coating having a porous first layer and a second relatively dense layer having a plurality of vertical gaps as outlined above. Notwithstanding the interpretation of the terms "crack" and "gap", Subramanian '539 clearly teaches the presence of cracks in the second layer which are arrested by the first layer. Subramanian '539 discloses that cracks propagate from the gaps and are arrested by the layer beneath the second layer.

Applicant argues that the vertical gaps 26 themselves are not the equivalent of the vertical cracks. This argument is not considered commensurate in scope with the instant claims, as the manner in which the cracks are formed is not claimed, nor is their distribution or size.

Applicant supports the argument with the argument that cracks are microscopic and do not have a dimension attached thereto. Applicant further argues cracks are therefore too small to support the teachings of application of material 30 to both sides of the gaps 26. However, cracks and gaps are synonymous. This is evidenced by the common usage of the terms. A crack in the layer is considered a gap in that the definition of "crack" according to Webster is "a narrow break" or "a narrow opening". Likewise, Webster defines "gap" as "a break in a barrier". In contrast to the arguments set forth, Applicant's specification particularly defines the desirable macrocracks as "those cracks greater than 0.004" in length, and predominantly oriented normal to the surface" (page 4, lines 1-2). The specification does not teach limitations that would negate the interpretation of the gaps of Subramanian '539 as being equivalent to the

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claimed vertical cracks. Nor does Applicant provide support for the contention that one skilled in the art could not consider the gaps 26 of Subramanian '539 as cracks. Thus, as gaps and cracks appear to be equivalent under the common meaning and the specification of the present application, the rejections are deemed proper.

As argued in the prior rejection, Applicant also states, and as taught by Subramanian '539, the first layer 20 serves to arrest propagation of cracks originating from gaps in the second layer. Therefore, even if one were to consider the gaps not to be cracks, Subramanian '539 teaches that the porous underlayer (first layer) arrests cracks emanating from these gaps. Therefore, as the first layer serves as a crack arrestor for the second layer, Subramanian '539 teaches the presence of vertical cracks extending from the gaps to the arresting layer. Thus, in the alternative to and in addition to the argument that the gaps can be considered to fall within the language of the claim, vertical cracks as claimed are taught by Subramanian '539.

Applicant then argues Subramanian '539 is concerned with a process for obtaining gaps in a coating surface and not in a process for forming a thermal barrier coating with vertical cracks. The manner in which the gap of Subramanian '539 is formed has no bearing on the fact that it is a break in the coating, and is considered a "crack". Further, as discussed above, vertical cracks as claimed are considered to be the equivalent of the gaps taught by the prior art.

Finally, Applicant points to the withdrawal of the rejection based upon Subramanian '137 in which similar gaps are also considered to be cracks. However,

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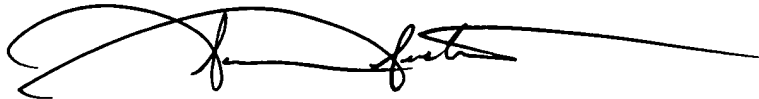
Subramanian '137 does not point to layer 20 as arresting cracks as the cracks may extend into the underlying coat, therefore this rejection was withdrawn.

**(11) Related Proceeding(s) Appendix**

No decision rendered by a court or the Board is identified by the examiner in the Related Appeals and Interferences section of this examiner's answer.

For the above reasons, it is believed that the rejections should be sustained.

Respectfully submitted,

A handwritten signature in black ink, appearing to read 'Aaron S. Austin', with a long horizontal flourish extending to the right.

Aaron S. Austin

Conferees:

A handwritten signature in black ink, appearing to read 'Jennifer McNeil', with a large loop at the end.

Jennifer McNeil, SPE 1775

A handwritten signature in black ink, appearing to read 'Carol Chaney', with a stylized, cursive script.

Carol Chaney, SPE 1773